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Requestor Jack Buddenbaum / K-25 Site Records
Document Center (is requested to provide the following document)

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Folder titled Job Specification JS-307
IV. Appendix - Health Hazards - provides air sampling instrument
data - Copy marked document

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SECURITY INFORMATION 88-307/SECT V/AP

V. APPENDIX

A. Health Hazards

1. In general, the methods employed to prevent the inhalation or ingestion of any toxic material or contact with any corrosive material applies equally well to the handling or processing of uranium. In the case of uranium compounds, both heavy metal toxicity and/or radiation damage may occur when the material is taken into the body by inhalation, ingestion or absorption through skin openings such as cuts, abrasions, etc. The primary hazard potential is considered to lie in the effects of inhaled material.
2. Normal uranium is an alpha emitter of low penetrating power and is not therefore considered to be an external radiation hazard. Its daughter products do emit both beta and gamma radiation which can penetrate sensitive body tissue; however, unless these daughter products are separated from the uranium, relatively large amounts of material would be required to produce high activity levels since the dose rate from a thick slab of pure uranium is only 240 mrep/hr.
3. The major control method used in handling uranium materials is to confine them, thus minimizing air contamination; avoiding widespread contamination of employee's persons, work areas, and equipment; and complying with applicable rules and regulations governing the movement and disposal of uranium contaminated materials.

B. Plant Acceptable Limits

1. Some of the present K-25 plant limits established for handling radioactive materials are contained in the attached tables. Where applicable, limits established or recommended by nationally recognized groups are used.

ALPHA CONTAMINATION DUE TO URANIUM

Table I

a. Personnel

<u>Instrument Readings</u> <u>at 50% Counting Geometry</u>	<u>Transferable Con. As</u> <u>Shown by Wipe Test</u>
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(1) Personal Contamination

Hands	100 c/min/hand ^{cm} 2
Body	250 c/min/100 ^{cm} 2

(2) Clothing and Equipment

<u>Clothing</u>	500 c/min/100 ^{cm} 2	100 c/min/100 ^{cm} 2
<u>Shoes, Personal</u>	500 c/min/100 ^{cm} 2	100 c/min/100 ^{cm} 2

Union Carbide Nuclear Company, Oak Ridge Gaseous
Diffusion Plant, Operating Contractor for the U.S.
Atomic Energy Commission.

This document has been approved for release
to the public by:

David B. Gilliland
Technical Information Officer
Oak Ridge K-25 Site

5/12/95
Date

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OFFICIAL USE ONLY(2) Clothing and Equipment (Cont'd)

	Instrument Readings at 50% Counting Geometry	Transferable Con. As Shown by Wipe Test
Shoes, Company Issued	5000 c/min/100 cm ²	100 c/min/100 cm ²
Gloves	500 c/min/100 cm ²	100 c/min/100 cm ²
Masks and Respirators	100 c/min/100 cm ²	50 c/min/100 cm ²

b. Environmental(1) Surface Contamination

Floors	800 c/min/100 cm ²	100 c/min/100 cm ²
Tables, tools, process equipment, etc	500 c/min/100 cm ²	100 c/min/100 cm ²

(2) OtherAir 1.7×10^{-11} $\mu\text{c/cc}$ (continuous exposure)**Water 8×10^{-5} $\mu\text{c/cc}$ (continuous exposure basis)INTERNAL EXPOSURE LIMITS FOR URANIUMTable II

Permissible Body Burden (total body) for Continuous
Exposure -
Urinary Excretion Rate Limit -

0.009 μc
26 $\mu\text{c/day}$

PENETRATING RADIATION EXPOSURE LIMITSTable III

<u>Type of Radiation</u>	<u>Part Affected</u>	<u>Exposure Limit</u>
Gamma	Total Body	300 mr/week
Beta	Total Body	300 mrep/week
Gamma	Hands & Forearms Only	1500 mr/week
Beta	Hands & Forearms Only	1500 mrep/week

c. Control Measures

- Essentially, the alpha contamination and air activity levels are used as action points, which, when exceeded, require consideration of the following:

**On a 40-hour week, this is interpreted as 3 disintegrations/minute/ft³ or 1 c/m/ft³, based on a collection and counting efficiency of 33 1/3% where the standard technique of collection on a filter paper and subsequent counting in an ionization chamber is used.

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- a. Physical confinement of contaminants. This may include the isolation of the operation, provision of hoods, the use of exhaust systems or dry box systems. Blanking of all system openings, and the use of vacuum pick-up systems.
- b. Limitation of spread of contaminants by work method and by decontamination of work areas. This may include the following:
 - (1) The use of catch pans, trays, and other containers.
 - (2) The application of strippable plastic coatings and certain acid-resistant paints to work benches, table tops, etc.
 - (3) Control of the movement of contaminated equipment from such areas to other plant locations.
 - (4) Decontamination of equipment where practicable prior to starting repair work.
 - (5) Isolation of the work areas from lunch and locker facilities and office areas.
 - (6) Control of the disposal of contaminated materials, recovering the uranium where practicable; in general, these disposals are handled as follows:
 - (a) Combustible contaminated wastes are incinerated.
 - (b) Non-combustible wastes and contaminated equipment are stored in isolated storage yards.
 - (c) Liquid wastes are disposed of through the normal plant disposal system where the amount of uranium released will not exceed the permissible activity level given for water.
- c. Use of personal protective measures such as:
 - (1) Restriction of entry to work areas to authorized personnel only, and prohibition of smoking and eating in these areas.
 - (2) Installation of "Hot" and "Cold" locker facilities and wash rooms, along with the provision of personal monitoring equipment.
 - (3) The use of respiratory protective devices where air contamination levels exceed the acceptable limits; for particulate matter, the Dustfree respirator with BM-2133 filter is used at K-25 while, for gaseous materials, the U. S. Army Assault Mask is used.
 - (4) Provision of protective clothing which may include shoes or shoe covers, coveralls, gloves, head covers, underwear and socks, depending upon the nature of the work and the extent of contamination.
 - (5) Appropriate pre-employment and periodic medical examinations for employees working with radioactive materials.
 - (6) The maintenance of medically and legally adequate personnel records.

D. Monitoring Requirements

In general, monitoring of a location with appropriate radiation detection instruments is required to determine the presence of contamination in the air and/or work surfaces as well as the intensity of beta-gamma radiation. Appropriate types of instruments and their applications are listed in Table IV. This list is not

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inclusive of all available instruments but does specify certain types which have been found acceptable at K-25.

TYPES OF RADIATION DETECTION DEVICES

Table IV

<u>Type</u>	<u>Application</u>
1. Samson Alpha Survey Meter	Detects and measures low levels of alpha contamination (approximate range: 30-10,000 c/min/100 cm ²).
2. Low Range GM Tube Instruments	Used to measure low level beta-gamma radiation (approximate range: background-20 mr/hr).
3. Juno, Low Range	Used to measure medium level beta-gamma radiation (approximate range: 0-5,000 mr/hr) and high levels of alpha contamination (above 2,000 c/m/100 cm ²).
4. Juno, High Range	Measures high level beta-gamma radiation (25 mr/hr - 25 r/hr).
5. Air Samplers (Tornado, Hi Velocity, etc.)	Used for collection of air samples.
6. Film Badger, Film Rings, Pocket Chambers, and Dosimeters	Personal monitoring devices to measure actual radiation dose to employees.

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